

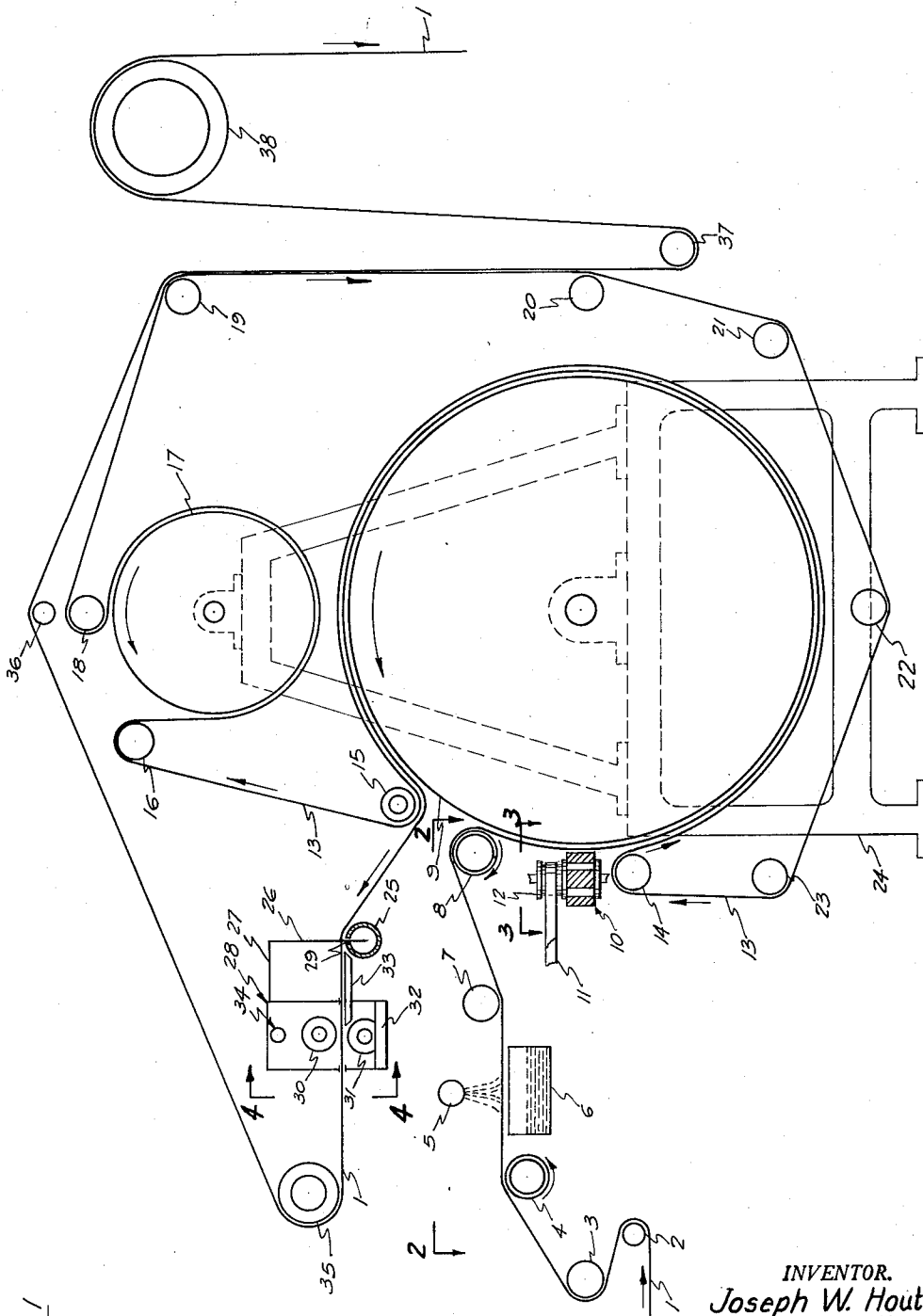
June 6, 1950

J. W. HOUTH ET AL
METHOD OF AND APPARATUS FOR REMOVING EDGE
ROLL FROM CLOTH SUBJECT TO THE SAME

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3 Sheets-Sheet 1



INVENTOR.
Joseph W. Houth
Paul L. Miller
Fred T. Miller

BY

Burgess, Ryan & Hicks
ATTYS.

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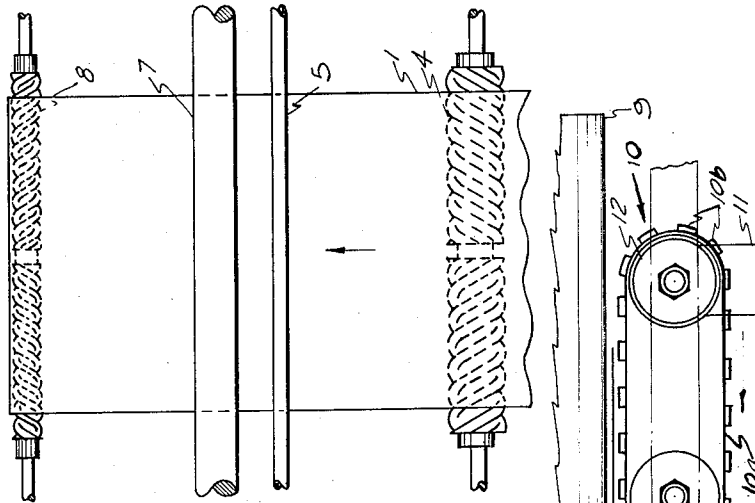
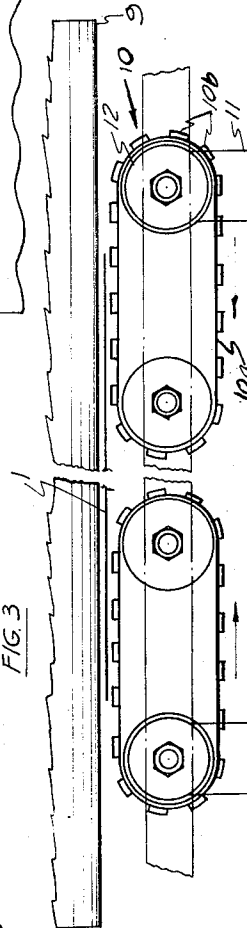
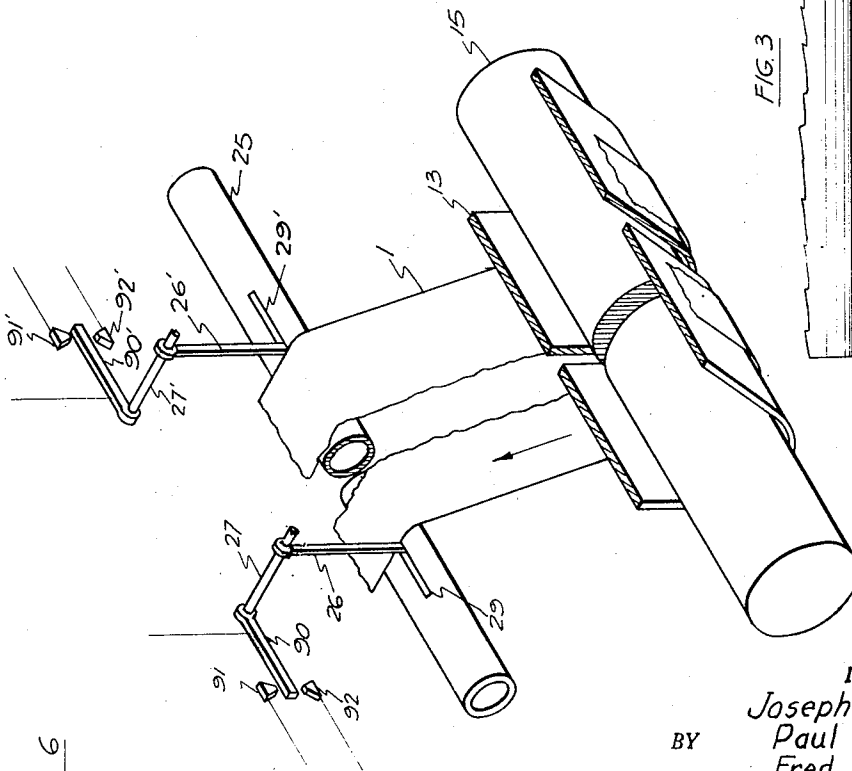
FIG. 2

FIG. 3

FIG. 6

INVENTOR.

INVENTOR:
Joseph W. Houth

Paul L. Miller

Fred T. Miller

BY

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ATTYS.

UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR REMOVING EDGE ROLL FROM CLOTH SUBJECT TO THE SAME

Joseph W. Houth, Aiken, and Paul L. Miller and Fred T. Miller, Clearwater, S. C., assignors to United Merchants & Manufacturers, Inc., Wilmington, Del., a corporation of Delaware

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5 Claims. (Cl. 117-7)

1 This invention relates to apparatus and a process for eliminating the so-called edge roll or tendency to curl up at the edges which is exhibited by various types of cloth. Certain types of knitted goods, for example, exhibit this tendency to a marked degree. In the past, the handling of such goods has been complicated by this objectionable characteristic and it has been necessary to resort to such time-consuming and costly expedients as pinning, pasting, tacking and the like to eliminate edge curl in order to facilitate the finishing operations.

The object of the invention is to provide an effective apparatus and method for permanently removing the edge roll from cloth of the character referred to and thus to simplify both its finishing and subsequent handling. Other objects and advantages of the invention will be apparent from the following description and accompanying drawings in which a preferred form of apparatus and method is shown.

In the drawings,

Fig. 1 is a diagrammatic elevational view of apparatus for carrying out the invention showing the sequence of the cloth processing operations;

Fig. 2 is an enlarged, broken-out view along the lines 2-2 of Fig. 1;

Fig. 3 is an enlarged, broken-out view along the lines 3-3 of Fig. 1;

Fig. 4 is an enlarged, broken view, partly in section and partly diagrammatic, along the lines 4-4 of Fig. 1;

Fig. 5 is a sectional view along the lines 5-5 of Fig. 4; and

Fig. 6 is an enlarged, broken view in perspective showing a portion of the apparatus.

Broadly speaking, the invention contemplates a method and means for preliminarily removing the edge roll from the cloth, thereafter setting the cloth in a form at least temporarily free of edge roll, and then applying a setting material to the selvages of the cloth to effect the permanent elimination of the edge roll. It has been found that, in passing a length of cloth through such a series of operations as contemplated herein, the cloth tends to creep or wander slightly from side to side; and while this lateral movement of the cloth is not extensive, it is sufficient, if not appropriately offset, to interfere with the application of the setting material to the edge-portions only of the cloth. Additionally, therefore, the preferred embodiment of the invention contemplates the provision of appropriate means for registering any such lateral

2 creep of the cloth, slightly in advance of the application of the setting material, and effecting such relative adjustment of the mechanism as will preserve the correct tracking of the setting material applicators in relation to the edges of the cloth.

The preliminary means for removing the edge roll comprises, in the present instance, one or more mechanical spreaders, such as scroll rolls. The cloth is temporarily set in an edge roll free form, preferably after wetting, by passing it in contact with a heated supporting surface, advantageously a moving heated surface. Care must be exercised in transferring the cloth from the spreaders to said surface to ensure that the cloth is completely flat and free of edge roll. According to the invention, the latter requirement is effected as the cloth, with the curl on the exposed side with respect to said surface, is advancing, means being provided for firmly and continuously brushing the cloth against the moving heated surface so as to maintain the two in contact and at the same time to uncurl the edges to a completely flat form. At this point a second moving surface contacts the cloth and serves to press it against the heated surface, maintaining this position long enough to impart a temporary set to the flattened cloth. Thereafter, the fabric passes over a support to position it for the application of the setting material to the selvages, which are at this point in a satisfactory flat form to receive the setting material. According to the invention, the applicators are arranged to occupy a predetermined position relative to the cloth and means are provided whereby the fabric and the applicators are movable relatively to each other. In the present instance, and as is preferred, such relative movement or adjustment is effected by mounting the applicators so that they themselves are movable laterally of the cloth in such manner as to maintain the predetermined setting of the applicators relatively to the cloth. The applicators are responsive to widthwise movement of the cloth as it advances past them, this result being secured in the present instance, by means of switches operated by the cloth itself.

The invention may be better understood by referring to Fig. 1 wherein 1 denotes an advancing web of rolled edge fabric. Guide rollers 2 and 3 position and tension the fabric for contact with a relatively coarse scroll roller 4 (Fig. 2), which serves to remove the larger folds and wrinkles. The fabric is then wetted by a water spray 5 to render it less resilient and to condi-

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tion it for temporary setting in a later stage. Trough 6 catches the drain water. Guide roller 7 introduces the fabric to a second scroll roller 8, which has a finer scroll than the roller 4 (Fig. 2) and which further reduces the edge roll. Scroll rollers 4 and 8 rotate in opposite directions, as shown, for greater efficiency. Scroll 8 operates adjacent the moving heated surface 9, which may be in the form of a heated roller, such as a palmer, and as the fabric passes over the scroll 8 it is contacted and supported by the moving surface 9, the contact being promoted by the wet condition of the fabric. The fabric at this point has the curl on the exposed side, so that as it advances with the moving surface 9, it encounter the continuously moving brush 10 which sweeps against the fabric transversely to the direction of movement of the same to uncurl the rolled edges. As shown, the brush is in the form of an endless belt 10a carrying a series of spaced brush elements 10b. Two brush units are provided, one for each selvage, as shown in Fig. 3. The brushes are driven continuously by means of a belt 11, pulley 12, and suitable drive means not shown.

The fabric is completely free of edge roll when it emerges from contact with the brushes, and to preserve it in this form it is immediately gripped between the moving surface 13 and the moving surface 9. The surface 13 is shown in the present case as a flexible, endless, blanket-like belt, but it is not necessarily limited to this form. The path of moving surface 13 is as follows: After leaving guide roller 14 it contacts the fabric, passes around the surface 9, leaves the fabric over roller 15, passes upwardly over roller 16, around the large roller 17, then over the guide rollers 18, 19, 20, 21, 22 and 23 and back to roller 14. The direction of travel of the surface 13 is indicated by the arrows in Fig. 1. During its contact between the surfaces 9 and 13, the fabric is subjected to sufficient heat, and advanced at such a rate, as to bring it to a point where it is just dry on leaving the surface 9. The means for applying heat, in the present instance, is by feeding steam to the palmer in accordance with the well known palmer construction, the details of which, such as the means for rotating the same, are omitted for the sake of simplicity. A frame 24 is shown for supporting the moving surface 9 and the large roller 17.

The fabric emerges from contact with the surfaces 9 and 13 in a form which is at least temporarily set or free of edge curl and passes under roller 15 to the hollow stationary supporting tube 25. Here it moves between a pair of suspended feeler rods, one of which is shown at 26, each being connected to a member 27, the latter in turn being secured to the applicator mechanism generally indicated at 28. The lower end of rod 26 is free to swing laterally in the slot 29 formed in the upper surface of tube 25. The applicator mechanism comprises two sets of applicator wheels, one set being shown at 30 and 31. Wheel 31 is arranged to continuously dip into a reservoir 32 of setting material and apply such material to the selvage of the fabric, and the wheel 30 acts as a backing surface. A support 33 positions the flattened fabric at the proper height for contact with the applicator wheels.

While the general position of the fabric with respect to its direction of movement is essentially in the center of the apparatus (Figs. 2 and 6), it has a tendency to move laterally in either direction to an extent sufficient to throw the selvages

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out of registry with the applicator wheels. The feeler rods serve to detect such widthwise changes in the position of the fabric. Considering one edge of the fabric for the moment, in normal operation the feeler rod 26 is in light contact with the fabric. If the fabric shifts laterally, contact with the fabric will be either increased or broken, and in either case the feeler rod will be sufficiently deflected from its normal position to set in motion suitable means such as is indicated at 34 for moving the applicator mechanism in the same widthwise direction as the fabric. Since the feeler rod is connected to the applicator mechanism, the movement of the latter will stop when the feeler rod has been brought to a normal, non-actuating position. In this manner the applicator wheels are caused to follow the lateral movement of the fabric and to be maintained in registry with the fabric selvages at all times.

The fabric with its selvages coated passes over the roller 35, guide rollers 36, 19, and 37, roller 38 and then may be collected in the usual way. In traversing the last-mentioned path, the setting material, which may include any of the well known resinous and thermoplastic coating agents but preferably comprises a solution of an alkyl cellulose ether, has ample time to dry.

As described the invention as illustrated is in the form of a palmer arrangement in which the moving surface or support 9 is driven by conventional means not shown. The endless surface 13 in turn is driven by moving surface 9, and the fabric is advanced through the apparatus by virtue of being compressed between these two surfaces. It is also advanced in the later stages of its processing by coming in contact with the moving surface 13 in the vicinity of the roller 19, at which point the positions of the fabric and the moving surface are such that the latter acts as a support for the fabric.

It will understood that many of the mechanical details described above do not in and of themselves form a part of the invention and can be varied widely. For purposes of illustration a preferred embodiment is shown of the means for maintaining the application of the setting material to the selvages of the fabric in accordance with the widthwise movement of the fabric. Referring to Fig. 4, which is a detailed, diagrammatic, and partly sectioned view, it will be seen that the applicator mechanism 28 comprises a pair of yokes 40 and 40' mounted on the threaded shafts 41, 41'. Each yoke (Fig. 5) comprises two identically shaped side members 42, 43, and 42', 43' (43' is not shown) joined together in spaced relation by bolts 44, 45 and 44', 45'. Yoke 40 is shown with one of the side members partly broken away to expose the inner construction, including the threaded block 46 by means of which the yoke is secured to threaded shaft 41 and adapted to be moved by rotation of said shaft. Since the shafts 41 and 41' are of a similar construction, except for being opposed to each other and acting in opposed relationship, only one of them will be described in detail, and the corresponding parts on the other will be indicated on the drawing by corresponding primed numerals. The shaft 41 is supported by the bearing 47, which is common to both shafts, and by the bearing 48 and the cap member 49. Shaft 41 is provided with the unit 50, which has gear and sprocket parts 51 and 52, respectively, and which, for convenience, will be referred to as a gear member. A similar gear member 53, having

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gear and sprocket parts 54 and 55, respectively, is disposed on shaft 41 in opposite relationship to the gear member 50, as shown. Gear members 50 and 53 rotate freely on the shaft. A dog clutch 56, slidably keyed to the shaft by means of key 57, is positioned between the gear members 50 and 53 and adapted to be engaged and driven by either gear member in response to displacement of the collar piece 58.

Shafts 59 and 60 extend between the side members of both yokes and serve to support and rotate the applicator wheels. Looking at the left hand wheels, comprising upper wheel 30 and lower wheel 31, it will be seen that each is secured to hubs 61 and 62, respectively. Hub 61 is keyed to the shaft 59 and adapted to slide along it in the keyway 63. Similarly, the hub 62 is keyed to shaft 60 and slides along it in the keyway 64. Secured to the ends of hubs 61 and 62 are pulley-like parts 65 and 66 having grooves 67 and 68, respectively, adapted to engage the bars or keys 69, 70 (Fig. 5), the latter being fastened to the side members of the yokes. By this arrangement the applicator wheels can be moved laterally simultaneously with the yokes. The right hand applicator wheels have the same construction as the left hand wheels and will not, therefore, be further described.

Shaft 59 is supported by bearings 71 and 71', and has at its right hand end a pair of sprocket gears 72 and 73, the latter being connected by chain 74 to the gear member 53'. At its left hand end shaft 59 is fitted with gear 75 and sprocket gear 76, the latter being connected by chain 77 to gear member 53. Sprocket gears 72, 73, and 76 and gear 75 are adapted to rotate with the shaft.

Shaft 60 is supported on bearings 78 and 78' and has at its right hand end a sprocket gear 79 which is connected by chain 80 to gear member 50'; at its left hand end it is fitted with the gear 81, which is adapted to engage the gear 75, and with sprocket gear 82, which is connected by chain 83 to the gear member 50. Sprocket gears 79 and 82 and gear 81 are fixed to rotate with the shaft.

Roller 15 is the same as that shown in Fig. 1, and furnishes the driving force for the assembly of shaft and gears in Fig. 4, being itself driven by the endless moving surface 13. It is supported on bearings 84 and 84' and has a fixed sprocket gear 85 at its right hand end which is connected by chain 86 to the sprocket gear 72.

In the top portion of yoke 42 a contact rod 90 is mounted which is adapted to close a circuit with either the contact 91 or the contact 92. The rod 90 is connected to member 27 which is in turn connected to feeler rod 26 (Figs. 5 and 6). Normally, feeler 26 is sufficiently supported by contact with the fabric to maintain the rod 90 out of contact with 91 or 92. When the fabric 1 moves laterally to the left (Fig. 4), deflecting feeler 26, the contact rod 90 is turned to make contact at 91. When the fabric moves laterally to the right, feeler 26, being no longer supported by the fabric, swings to the right and the contact rod 90 makes contact at 92. Contact 91 is connected to the coil of solenoid 93, while contact 92 is connected to the coil of solenoid 94, both solenoids being connected to a source of power, not shown. Pole pieces 95 and 96 are secured to the arm 97, which is pivoted at 98. When solenoid 93 is energized, for example, it attracts the pole piece 95 and arm 97 is consequently swung to the right, collar piece 58 being swung to the left and thus pushing the clutch 56 into engagement with the gear mem-

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ber 55. Solenoid 94 acts similarly, but in an opposite direction.

The top portion of yoke 42' is identical in construction to yoke 42 and will not be described.

In the operation of the applicator mechanism shown in Fig. 4, the fabric normally passes over the stationary tube 25 and support 33 in such a position that its selvages are in registry with the applicator wheels and are coated by them with setting material. The applicator wheels are caused to turn with the fabric, by which is meant that at their contact points with the fabric they are moving in the same direction as the fabric. This result is accomplished by means of the drive connection between roller 15 and shaft 59, involving the chain 86. The fabric in Fig. 4 is moving in a direction towards the observer, while the roller 15 rotates in a direction approaching the observer at its bottom and receding from the observer at its top, as can be verified by examining Fig. 1. Shaft 59, of course, will have the same rotation as roller 15, while shaft 60 will have an opposite rotation since it is driven by shaft 59 through the gears 75 and 81. The applicator wheels on shafts 59 and 60 will have the same rotation as their respective shafts, being secured to the shafts by the keyed hub assemblies as described above.

It will be observed that the gear members 53 and 53' will have the same rotation as shaft 59, being driven by said shaft through the chains 77 and 74, respectively, and that gear members 50 and 50' will have the rotation of shaft 60 due to the drive connections 83 and 80, respectively. As stated, the gear members 50, 50', 53 and 53' are free to rotate on their respective shafts.

With the applicator mechanism functioning in the normal manner, i. e., with the fabric centered between the right and left hand applicator wheels, the feeler rods 26 and 26' will be in upright, non-actuating positions, and therefore no contact will be made at the contact points 91, 92, 91', or 92'. The solenoids will be unenergized and the clutches disengaged. If, now, the fabric moves laterally to one side, say against the feeler 26 and away from the feeler 26', the displacement of the former will close the contact 91, and solenoid 93 will become energized, causing the clutch 56 to be moved into engagement with gear portion 54 of rotating gear member 53. Threaded shaft 41 is thus made to rotate in the direction of shaft 59, and due to the left-hand thread construction of shaft 41, the threaded block 46, and also yoke 42, will move towards the left, or in the direction of lateral movement of the fabric. Since the applicator wheels 30 and 31 are secured to the yoke by means of the so-called pulley and key assembly as described, they also move in the direction of the lateral movement of the cloth, the hubs 61 and 62 sliding along shafts 59 and 60 in keyways 63 and 64, respectively. Coincident with the foregoing operations, the displacement of feeler 26' will close the contact 92' (Fig. 6), and solenoid 94' will become energized, causing clutch 56' to be moved into engagement with gear member 50'. Threaded shaft 41' is thus made to rotate in the direction of shaft 60, and yoke 42' will be driven towards the left, or in the direction of lateral movement of the fabric, through the means of a threaded block (not shown) of opposite characteristics to the threaded block 46. The lateral movement of the yoke 42, and also yoke 42', will end when the feelers 26, 26', which are secured to the yokes, are moved to non-actuating positions. Such positions are always attained because the

extent of lateral travel of the fabric is limited. With the feelers 26, 26' in normal, non-actuating positions, the contacts at 91, 92' will open, de-energizing the solenoids 93, 94', and clutches 56, 56' will be swung out of engagement with the gear members 53, 53', respectively.

The operation of the applicator mechanism when the fabric moves laterally against feeler 26' and away from feeler 26, is similar to the operation just described, but in this case the solenoids 93' and 94 will become energized and the clutches will be swung in the opposite directions to those above described, resulting in a movement of the yoke towards the right in Fig. 4.

It will be understood that the form of the invention as shown and described is simply illustrative, and that the general principles involved may be applied in other forms within the scope of the invention as defined in the appended claims. In the light of the foregoing description, the following is claimed:

1. In an apparatus for removing edge roll from knitted cloth comprising moving heated surface means for receiving the cloth and a second moving surface means adapted to compress the cloth against said first surface, both of said surface means serving to advance the cloth through said apparatus, the combination therewith of spreader means positioned in advance of said surface means to remove relatively coarse folds from the cloth, brush means continuously brushing the cloth against said moving heated surface means in a direction adapted to open said edge roll to a flat position, support means for receiving the cloth as it is discharged from said moving surface means, applicator means adjacent said support means adapted to apply setting material to the selvages of the cloth, and means for detecting widthwise movement of the cloth in advance of the application of setting material thereto and for maintaining the applicator means in registry with said selvages.

2. In an apparatus of the character described, the combination of supporting surface means, means for guiding a length of cloth into contact with such surface means with the edge curl of the cloth on the side thereof away from such surface means, brushing means bearing on the marginal portions of the cloth on such side thereof and adapted for outward movement transversely of such edges to flatten the edge curl portions into contact with the said surface means, means for temporarily maintaining the cloth in its said flattened condition, setting material applicators located one adjacent each edge of the cloth and mounted for adjustment laterally thereof, and means responsive to lateral movement of the cloth adapted to effect a commensurate lateral adjustment of the said applicators.

3. In an apparatus for removing edge roll from knitted cloth comprising a moving heated surface means adapted to contact the cloth and a second moving surface means adapted to compress the cloth against said first surface means, both of said surface means serving to advance the cloth through said apparatus, the combination therewith of spreader means positioned in advance of said surface means for removing relatively coarse folds from the cloth, wetting means for rendering

the cloth less resilient, a second spreader means positioned beyond said wetting means for spreading the cloth to a further degree of flatness, brush means for continuously brushing the cloth against said moving heated surface means to open said edge roll to a flat position, support means for receiving the cloth as it is discharged from said moving surface means, applicator means adjacent said support means for applying setting material to the selvages of the cloth, and switch means for detecting widthwise movement of the cloth in advance of the application of setting material thereto and for effecting commensurate changes in the position of said applicator means widthwise of the cloth.

4. A method for producing knitted cloth free of edge roll which comprises spreading the cloth widthwise in a first step to remove a portion of said edge roll, wetting the cloth to render it less resilient, spreading the cloth widthwise in a second step to further remove said edge roll, advancing the cloth while coincidentally heating and supporting the same, brushing the selvages of the advancing cloth in a direction to completely uncurl said edge roll and to flatten the cloth, compressing the flattened advancing cloth while continuing to apply heat thereto to set the cloth at least temporarily in a form free of edge curl, removing the cloth from its compressed position, said cloth being subject to widthwise movement as it advances, applying setting material to the selvages of the advancing cloth, and changing the point of application of said setting material to the selvages in accordance with the widthwise movement of the cloth.

5. A method for removing the edge roll from knitted cloth subject to such edge roll which comprises spreading the cloth widthwise in a first step to remove a portion of said edge roll, advancing the cloth while coincidentally supporting and heating the same, brushing the selvages of the advancing cloth in a direction to completely uncurl said edge roll and to flatten the cloth, compressing the flattened advancing cloth while continuing to apply heat thereto to set the cloth at least temporarily in a form free of edge curl, removing the cloth from its compressed position, said cloth being subject to widthwise movement as it advances, applying setting material to the selvages of the advancing cloth, and changing the point of application of said setting material to the selvages in accordance with the widthwise movement of the cloth.

JOSEPH W. HOUTH.
PAUL L. MILLER.
FRED T. MILLER.

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